Saskatchewan Agriculture, Food and Rural Revitalization

Farm Facts

Grazing Management for Sheep Production

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1. Observe Sheep Behaviour to Help Grazing Management

Observing grazing animals can provide the livestock producer with valuable information on the quantity and quality of the forage available to the animals. Observation is perhaps the most important tool for making grazing management decisions. With a little practice, a producer can become adept at "eye-balling" the approximate amount and quality of forage being consumed by his livestock.

Ruminant animals graze wherever and whenever forage is available, therefore, a producer cannot say that he does not practice "grazing management". Grazing occurs either by design—when controlled by a knowledgeable manager—or by default—when animals are allowed to graze on their own without regard for plant and animal requirements. A livestock producer must visit his pastures frequently, not only to check the animals, but also to check the forage. This allows the producer to monitor what is happening with the pasture and to anticipate and correct any potential problem before it results in reduced livestock performance.

A grazing management plan must be designed with both plant growth and animal performance in mind. For long-term sustainability, there must be a balance between plant and animal requirements.

- Plant growth is maximized when they are "harvested" (or grazed) at maturity, but at that point the forage quality is low and animal performance may suffer because the nutritional needs of the animal are not met.
- Animal performance is maximized if the plant is grazed while it is actively growing (i.e. producing high-quality feed), but repeated, uncontrolled grazing will result in animals selectively consuming the highly nutritious and palatable plants while leaving the unpalatable ones. Over time, this will cause the disappearance of desirable plants (called decreasers) and the predominance of less desirable and undesirable ones (called increasers and invaders).

Some points to consider when observing animals and interpreting their grazing behaviour are:

- Less time is spent grazing when forage is plentiful and of good quality; more time is spent grazing when quantity or quality is limited.
- Herd animals tend to graze as a group when forage is plentiful and as individuals when forage is scarce.
- A well-established browse line indicates excessive grazing pressure (a browse line is a well-defined height to which browse such as leaves, twigs and woody growth has been removed by animals).
- Midday grazing during hot weather indicates that forage is limited.

2. Sheep Grazing Patterns and Behaviour

Grazing animals are looking for green plant material. Their first preference is new green leaves. When new green leaves are not present, the animals will eat older green leaves, followed by green stems, then dry leaves, and finally dry stems. Grazing animals are also looking for plants that they consider

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palatable. Sheep have narrower mouths and more flexible lips than cattle, therefore, they can be more selective in their grazing by taking individual bites. Ruminants swallow their food as soon as it is lubricated and after they have consumed a certain amount, they ruminate. Cattle usually graze for four to nine hours a day, and sheep and goats for nine to 11 hours a day. Animals usually graze, then rest and ruminate. Sheep rest and ruminate more than cattle: seven to 10 hours a day as opposed to four to nine hours a day for cattle.

- Sheep can graze rugged terrain more easily than cattle.
- Sheep are reluctant to graze areas that have natural predator cover.
- Sheep may walk from three to five kilometres for water (depending on topography). The distance they have to travel has a significant influence on production. The greater the distance to water, the more energy and time is needed to satisfy the sheep's requirements.
- Sheep need from 7.5 to 10 litres of water per day.
- Livestock seek shade and cool locations during hot summer periods, resulting in excessive grazing under trees and in riparian areas.
- Livestock usually overuse dry southern exposures early in spring and then switch to riparian and shaded areas during hotter times of the year. North facing slopes usually remain underused.
- Sheep have a strong flocking instinct and maintain social spacing and orientation in pens as well as pasture. Breed, stocking rate, topography, vegetation, shelter and distance to water may influence this instinct, but isolation of individual sheep usually brings about signs of anxiety and may cause the sheep to try to escape.
- Sheep tend to "follow" one another even in activities such as grazing, bedding down, reacting to obstacles and feeding.

Some pasture characteristics that influence how close actual intake gets to potential intake are listed below.

- **Forage Selection.** Grazing animals are very selective in what they eat. Their choices are influenced by the presence of secondary compounds (phenolics, volatile oils), plant morphology (such as thorns and thick cuticles, dried "stemmy" material) and past grazing experience. Sheep tend to avoid the older seedstalks or "stemmy" grass. An increase in the number of seedstalks in a pasture will reduce the sheep's grazing intensity; however, when seedstalks are removed (such as by cutting during the previous fall), sheep's preference for the non-stemmy forage increases.
- **Preference.** An animal's forage selection is more a function of its past experience than its breed. Grazing is an acquired skill, which is learned at an early age. This means it is possible to train an animal to consume certain plants, such as leafy spurge, for vegetation control.
- **Palatability.** Livestock select food that has the most pleasing texture. They also choose familiar foods. Green material is preferred over dry material, and leaves over stems. Palatability is affected by fibre content, bitterness or sweetness, water content and plant abundance.

Note table 1 on page 4, the table of the relative proportions of grass, forbs and browse in the diets of cattle, sheep and goats.

3. Understand Forage Growth

Plants obtain their energy from sunlight by producing carbohydrates through photosynthesis. In order for perennial pasture grasses to remain productive, the photosynthetic process must first feed the plant before it can provide feed for animals. Photosynthesis (which in green plant cells generally occurs in the leaf) produces carbohydrates for the plant. Carbohydrates are used for plant growth, maintenance, storage and reproduction. In plants, growth is the first priority for the available carbohydrates. If the green leafy areas of actively growing plants are repeatedly removed or consumed (grazed, clipped or mowed) the plant will use energy (mostly stored from previous production) to continually attempt to replace the leafy areas. If the plant's leafy area produces more than enough carbohydrates to meet the growth and maintenance demands, then the excess becomes available for storage. Since growth has priority over storage for available carbohydrates, repeated defoliation (heavy uncontrolled grazing) during the growing season will seriously deplete a plant's stored carbohydrates. This repeated interruption of a plant's capacity to store energy is the basis for using grazing or mowing as a tool for weed control or vegetation management. It is important to note that carbohydrate storage increases when the growth rate slows and the leaf area

is large. Conversely, carbohydrate storage decreases when leaf area is small and growth rate is fast.

Perennial plants must have sufficient stored energy to survive the winter, begin growth the following spring and recover after complete defoliation. Defoliation occurs as a result of grazing but also as a result of clipping, mowing and other events such as disease, insects, frost and hail. Adequate levels of carbohydrates that help ensure a long-lived and vigorous perennial forage stand can best be maintained by:

1. delaying defoliation or keeping early defoliation periods short;
2. allowing adequate leaf area to remain after defoliation;
3. allowing adequate time between defoliations to permit leaf area and carbohydrate reserves to build;
4. allowing adequate residual leaf area and time late in the season to permit carbohydrate build-up and bud development.

Rotational grazing is most necessary on perennial pastures, especially if several species, such as smooth brome and alfalfa, are mixed together in the pasture. Without rotational grazing, sheep will selectively graze the plants they prefer, and avoid the rest. Over-grazing soon weakens the preferred species and the unpalatable plants crowd them out. As a result, only the less desirable plants are available for future grazing. Rotational grazing forces sheep to consume all species more or less equally and allows all grazed plants to recover and regrow while sheep graze other pastures.

4. Grazing Management Principles and Planned Grazing Systems

The traditional herd system (where the flock is herded and bedded in an open area near the shepherd's mobile camp) is most suited to large tracts that are grazed only once per season for a short time. Herding is impractical for most sheep production in Saskatchewan, so the system of choice of Saskatchewan sheep producers is confined (fenced) grazing. This means planning is necessary to manage and control where the sheep are permitted to graze.

Fencing, strategic placement of salt, herding and water development can result in more uniform livestock distribution. Grazing systems are designed to control timing, intensity and frequency of grazing. Over the long term, a successful grazing system does the following:

- balances livestock numbers with forage supply;
- uniformly distributes livestock over the pasture, and reduces selective grazing;
- alternates periods of grazing with periods of regrowth(this regrowth must occur during active growing periods to be effective);
- maintains a healthy plant community with a desirable distribution of species and plant age classes, avoids damage to grazed plants when they are most susceptible;
- maintains healthy watersheds and soil;
- meets physiological needs of grazing animals;
- optimizes livestock gain per acre;
- uses methods that are environmentally sound, practical to implement, simple to operate and flexible in case of unforeseen circumstances; and
- addresses the needs of the entire ecosystem, including plants, wildlife, domestic livestock and soil.

Range improvements and grazing systems attempt to control livestock behaviour. Range management can be defined as the art and science of manipulating, using and conserving grazing land resources while maintaining ecosystem integrity. The four basic principles of range or pasture management lead to increased livestock production, improved watershed and ecosystem stability and long-term sustainability. They are:

- graze range or pasture at the right time of year and to the right degree;
- leave adequate leaf area for regrowth to ensure the restoration of individual plant vigour;
- allow adequate "rest" for the forage in your pastures, keep livestock off the range for a period during the active growing season to allow adequate regrowth for next year; and
- control livestock distribution and access to minimize selective grazing and prevent regrazing of plants.

These principles are fundamental to the wise management of grazing resources, and are applicable to both tame and native pastures. Grazing can have long-term negative effects if these principles are not followed. Poor management will lead initially to reduced plant vigour. Continued poor management will cause a loss of valuable forage plants, drought resistance, ground cover and range productivity. Ultimately, the condition or health of the range will deteriorate to such an extent that animal weight gains and productivity are negatively affected.

5. Multi-species Grazing

Grazing a variety of species on the pasture, either simultaneously or in sequence, can be used to distribute grazing pressure, maintain or improve plant diversity and diet quality, and spread economic risk. Also, the effects of multi-species grazing can be duplicated by grazing two groups of the same species which have different nutritional requirements, as determined by their class and stage of production. For example, lactating ewes with lambs should be placed on the highest quality pasture available to promote desired levels of milk production and lamb growth. Dry, non-pregnant ewes or ewes in early to mid-gestation should be placed on lower quality forages or serve as second grazers behind young, growing lambs. Strategies that match stage of animal production with type and quality of forage improves overall forage utilization while maintaining optimum animal performance.

Producers should keep in mind that different animals prefer different forages, as shown in Table 1 (Taylor, 1981):

- Cattle diets consist primarily of grass.
- Sheep tend to prefer forbs over grass and browse.
- Goat and deer diets contain large amounts of browse compared to cattle and sheep diets.

Because of the different dietary preference, mixing kinds of livestock under certain conditions is possible. However, the forage source must have the necessary diversity and production for the animals to meet their dietary preferences. For example, cattle and sheep will compete if grazed together in a predominately grass pasture. However, they will complement each other if grazed in a pasture with a high proportion of forbs and browse. Whatever the forage source, grazing cattle and sheep together will place increased management requirements on the operator. The fencing and other infrastructure needed to handle the two kinds of livestock are different. The herd health issues (recognizing, treating and dealing with sick animals) will also be different.

Table 1: Relative proportions of grass, forbs and browse in the diets of cattle, sheep and goats

Kind of Forage	Cattle	Sheep	Goats
Grass	60%	40%	20%
Forbs	20%	40%	30%
Browse	20%	20%	50%

Taylor, C. A. Jr. 1981. *Optimal use of range with mixtures of livestock.* pp. 166.175. In White, L. D. and Hoermann, L. A. (eds.). Proceedings of the International Ranchers Roundup, Del Rio, TX. Texas Ag. Ext. Serv., Uvalde, TX 434 pp.

Making use of combinations of animal species in a grazing plan can benefit the range resource, the grazing animals and the producer.

- Small ruminants can control and utilize plants that cattle will not or should not eat.
- By grazing taller, courser forage, cattle can provide sheep better access to the short, tender regrowth.
- Multi-species grazing may spread the economic risk between the commodity prices. At any given time, one species may provide better returns while the other is not as profitable .

The disadvantages of multi-species grazing are the increased need for fencing, water distribution and storage troughs, handling facilities and management skills. Access to and knowledge of the markets for more than one species may also constrain multi-species grazing.

6. Sheep Stocking and Nutrient Requirements

Forage supply and forage demand are both expressed in a standardized unit called an "Animal Unit" or AU. An Animal Unit is a 1,000-pound mature cow. An "Animal Unit Month" or AUM is the amount of forage required by an Animal Unit for one month. "Animal Unit Equivalents" or AUE are used to maintain the standardization when converting from or to different kinds and classes of animals. Sheep have Animal Unit Equivalents (AUE) of 0.20 for ewes and 0.26 for rams. This means that one AUM of forage would supply enough feed for five ewes. To put this another way, five ewes will demand one AUM of forage.

To illustrate the initial stocking rate for a "typical" tame pasture in southern Saskatchewan (an unfertilized, four- to six-year-old stand in the Brown Soil Zone with coarse ["light"] texture) follows:

The Initial Stocking Rate for five ewes (or one AUM - equivalent to one 1,000-pound cow) that are to be grazed and using the previous assumptions (note table 2):

Table 2: Sample initial stocking rates

Forage	AUM/ac	5 ewes grazing days/ac
Alfalfa	1.0	28
Crested WG	0.5	14
Meadow BG	0.5	14
Russian WR	0.5	14
Altai WR	0.4	11
Smooth BG	0.4	11
Western WG	0.4	11

(Note - specific details for other soils and forage stands can be obtained from the SAFRR publication, *Initial Stocking Rate Recommendations for Seeded Pastures in Saskatchewan.*)

The most critical periods in the sheep production cycle are:

1. breeding through very early pregnancy;
2. late pregnancy through the neonatal period;
3. overall lactation; and
4. weaning.

Selection of breeding season dictates when each of the critical periods falls in relation to the forage cycle. Nutrients in forages are highest soon after the forage emerges and before it matures. Therefore, animals with low production potential or with low nutritional requirements (dry, non-pregnant adults) could be used to graze mature forage. Animals in the breeding, late pregnancy or lactation periods, or newly weaned lambs should use a pasture that is producing high quality forage.

7. Bloat

Bloat occurs in ruminants when gas produced during fermentation becomes trapped inside the rumen rather than being expelled through eructation or belching. The resulting rumen distension can exert pressure on the animal's respiratory and circulatory systems to the point of death.

Management to lessen problems with bloat

Bloat can be reduced through the following pasture management methods.

- Plant pastures so that no more than 50 per cent of the forage mixture is alfalfa or clover. Consider planting non-bloating legumes such as birdsfoot trefoil, sainfoin and cicer milkvetch (AC Grazland is an alfalfa variety that can reduce but not eliminate bloating).
- Fill up animals on dry roughage or grass pastures before turning them out onto legume pastures. A hungry animal may overeat when given access to fresh pasture and develop bloat.
- Move the livestock onto alfalfa at mid-day instead of the prime grazing times of morning or evening.
- Minimize bloat by turning animals onto alfalfa that has reached the bloom stage or later. The more mature the alfalfa, the less the risk of bloat. Once alfalfa has flowered, the risk of bloat is greatly reduced.
- Bloat also appears to be more prevalent if the animals eat only the upper portion of the plant, which is high in rapidly degradable protein. Grazing animals at a high stocking rate will minimize this problem.
- Provide the animals with grass pasture, hay, crop residue or grain along with the legume on pasture to reduce their consumption of the legume.
- Graze in a rotation using different grass and legume pastures or strip-graze (with electric fencing) to force animals to eat most of the plant material rather than just the succulent top growth.

8. Prepare to Manage Through Drought

Predicting Drought: If drought is an unanticipated period of below-normal precipitation that affects the amount of forage available for livestock, then predicting and compensating for the decrease in forage production would "drought-proof" a livestock enterprise. It is best to begin managing for drought far in advance of the next dry period. Monitor and evaluate the season's forage growth potential by knowing and understanding the region's historical rainfall patterns during the prime forage growing season. As the rain is becoming deficient for the growing season it is time to act. For example, Environment Canada's 30-year average April, May and June cumulative rain recorded at the Elbow, Kindersley and Saskatoon stations in west central Saskatchewan is slightly greater than four inches. If the cumulative rain is only 25 to 30 per cent of the normal (no greater than 1.25 inches) by the time the growing season reaches early to mid-June, there will not be much opportunity for significant growth because the chances of above-average rainfall during the rest of June (to compensate for the early season's shortage) is slight.

It has been said that "it is not how much one makes in the good years but how much is not lost in the bad years that keeps you in the livestock business." Once the monitoring has determined that the extended dry period (or early stages of a drought) is imminent, there are a number of decisions and actions that could help producers better survive drought. (Strategic – what we do to plan for the foreseeable future? Tactical – what we do this year? And operational – what we need to do this week?)

Strategic: A longer-term livestock production strategy should provide flexibility for marketing livestock, provide longer recovery periods for pastures and include adequate water for the animals.

- Plan and develop long-term water availability; water is often the first thing that becomes limited in a drought; therefore, new sources, efficient delivery (such as shallow pipeline) and increased storage and trough capacity should be developed in the non- or pre-drought years.
- Choose an enterprise mix compatible with drought risk. It is important to have a significant (relative to your drought tolerance) proportion of the livestock in the operation that can be liquidated on relatively short notice. These classes of livestock should be relatively easy to market in early to mid-summer (or alternatively to choose not to purchase early). Sheep producers could consider beef steers or heifers.
- Divide the grazing areas into smaller pastures to allow for longer recovery periods (for the forage). Relatively large numbers of pastures per flock (herd) are an advantage during drought because the number of days in the season that an area is grazed will be reduced and, at the same time, the days available for forage recovery are increased. Having more recovery days during the season increases the chance of getting rain and grass growth while the livestock are gone.

Tactical: A producer should make an action plan to help determine what to do at the time of the drought during the year.

- Monitor forage demand and effective rainfall, and adjust demand (stocking) to match it more closely with the expected reduction in forage supply in a timely manner.
- Determine de-stocking policies well in advance of implementation. The longer adjustments are delayed the greater the difference between supply and demand will become.

Operational: Day-to-day operational management decisions and actions should deal effectively with the drought.

- Know rainfall patterns for your region and when the prime time for forge growth can be expected. (Example: The April to July accumulated rainfall is just over four inches in west central Saskatchewan.)
- Monitor the forage use and cumulative rainfall on pastures, and adjust stocking rate on a timely basis.
- Lengthen forage recovery periods to provide adequate recovery for plants between grazing periods in order to compensate for slow growth rates (slow plant growth = long recovery; rapid plant growth = fast recovery).

9. Weed/Vegetation Control Using Sheep

Sheep producers can use their animals for weed or vegetation control. Sheep grazing has been shown to be an effective method for controlling vegetation. Sheep can provide an alternative to chemical control; they can be used where herbicides cannot be applied, such as near environmentally sensitive areas, and in terrain where it is difficult to conduct chemical spraying.

Sheep and goats definitely eat weeds, but these animals may not be a practical method of weed control for landowners who have only minor weed infestations or small patches. Alternative vegetation control may be more suited for such circumstances. As well, in more extensive infestations or in large areas that require vegetation control, significant infrastructure (such as water and fencing) may need to be put in place.

A sheep producer must decide whether he is managing for maximum sheep production or vegetation management. Grazing will control top-growth of weeds and unwanted vegetation, but an exclusive diet of weeds may not result in optimum weight gain for the animals' production.

Grazing will control but not eliminate weeds. For adequate long-term weed control, grazing can be implemented as part of a larger, integrated weed-control strategy. The sheep will eat the undesirable plants, thus reducing competition for the desirable plants, which permits them to become more vigorous and increase. However, while visual fence line contrasts and stem density counts at the Mortlach Provincial Sheep Pasture showed a considerable reduction in leafy spurge, the weeds are still present in the pasture even after 30 years of sheep grazing. This means that once the sheep are removed, the weed problem will reappear.

Proper management of the flock is critical to evenly remove unwanted vegetation yet maintain the desired plants over the entire area. Some recommended techniques are:

- Keep the sheep together as a cohesive unit.
- Use well-trained dogs.
- Camp next to night corrals to ward off predators.
- Never leave the sheep unattended.

Some findings on sheep grazing preferences (in the forested areas) are:

- sheep prefer new, succulent growth, whether it is the spring flush or regrowth after a first graze;
- vegetation degraded by frost or drought is less palatable to sheep;
- target vegetation should be less than one metre tall so that the sheep can graze the entire plant; and
- target vegetation must not be woody, as sheep will leave stems and graze only the leaves in the late summer.

10. Contacts, Further Reading and Acknowledgements

Contacts

Saskatchewan Sheep Development Board
Saskatchewan Sheep Breeders' Association

Further Reading

A Practical Guide to Selecting the Right Forage Species
Saskatchewan Forage Production Guide
The Western Canadian Sheep Production Manual
Initial Stocking Rate Recommendations for Seeded Pastures in Saskatchewan
Getting Started in Sheep
Sheep Production and Marketing
Basic Sheep Management
Livestock Predation – Livestock Guardian Dogs
Facts About Saskatchewan Lamb
Sheep Breeds in Saskatchewan
Financial and Production Targets for Sheep Producers
Grazing Systems for Rangelands of Southern Saskatchewan

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